

Future Site of Argonne's ENERGY SCIENCES BUILDING



4th US – CHINA Electric Vehicle and Battery Technology WORKSHOP

第4届 美国-中国电动汽车和电池技术研讨会

August 4-5, 2011

2011年8月4号 - 8月5号

Sponsored by (主办):

U.S. Department of Energy

美国能源部

China Ministry of Science and Technology

中国科技部

Hosted by (承办):

Argonne National Laboratory

阿岗国家实验室



www.cse.anl.gov/us-china-workshop-2011

Argonne Guest House
阿岗招待所



Theory and Computing Sciences
Building 240
理论和计算科学楼(240号楼)



AON Center
Chicago
AON 中心
芝加哥



Aerial View of Argonne
阿岗俯视图

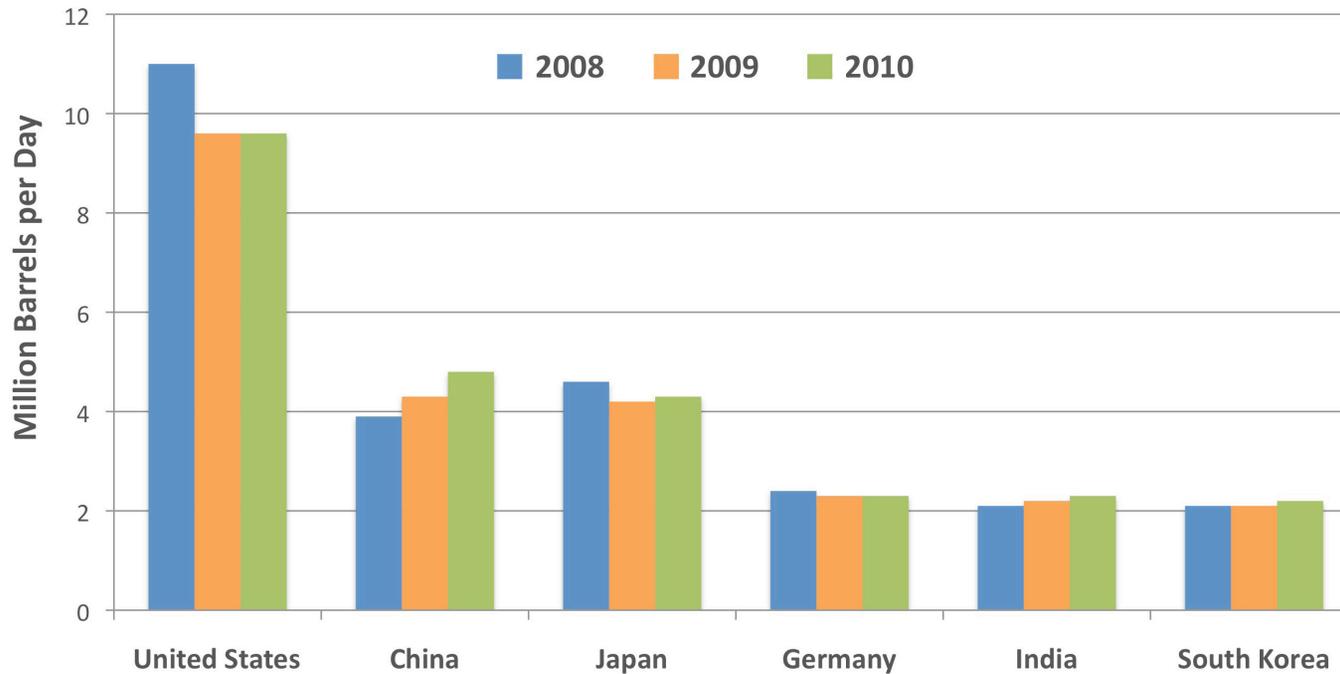


On the Cover ▶ Illinois Senator Durbin, University of Chicago President Zimmer, Department of Energy Secretary Chu, and Argonne Director Isaacs wield shovels at the groundbreaking ceremony for the Energy Sciences Building, the future home of Argonne battery research.

封面上 ▶ (左起) 伊利诺伊州议员 Durbin, 芝加哥大学校长 Zimmer, 美国能源部部长 Chu, 和阿岗实验室主任 Isaacs 阿岗能源科学大楼破土动工仪式, 未来阿岗电池研究基地

Top World Oil Net Importers 2008-2010

2008-2010 年世界主要石油进口国日进口量



Source: U.S. Energy Information Administration (EIA), China Country Analysis Briefs, 2009-2011 (charts).
来源: 美国能源信息管理局, 中国国家分析简报, 2009-2011

China's net oil imports reached about 4.3 million barrels per day in 2009, making it the second-largest net oil importer in the world behind the United States and for the first time surpassing Japan's imports.

中国原油进口2009年达到每天4百30万桶, 超过日本成为美国之后第二大石油进口国

Survey Question

► By 2020, electric-drive vehicles (HEVs, PHEVs, and BEVs) will be what percent of new light-duty vehicle SALES?

到2020年, 电动汽车 (HEVs, PHEVs, and BEVs) 占市场轻型车销售的百分比是多少?

China: <5% 5 – 10% 10 – 20% >20% 根据中方预计数据 as forecast by the Chinese

US: <5% 5 – 10% 10 – 20% >20% as forecast by the Americans

FACT SHEET: U.S.-China Electric Vehicles Initiative

November 17, 2009

Today, President Barack Obama and President Hu Jintao announced the launch of a U.S.-China Electric Vehicles Initiative. The two leaders emphasized their countries' strong shared interest in accelerating the deployment of electric vehicles in order to reduce oil dependence, cut greenhouse gas emissions and promote economic growth. Activities under the initiative will include:

- Joint standards development. The two countries will explore development of joint product and testing standards for electric vehicles. This will include common design standards for plugs to be used in electric vehicles, as well as common test protocols for batteries and other devices. Each country currently has extensive literature and data on its own standards. Making this information mutually available and working towards common standards can help facilitate rapid deployment of electric vehicles in both countries.
- Joint demonstrations. The Initiative will link more than a dozen cities with electric vehicle demonstration programs in both countries. Paired cities will collect and share data on charging patterns, driving experiences, grid integration, consumer preferences and other topics. The demonstrations will help facilitate large-scale introduction of this technology.
- Joint technical roadmap. A U.S.-China task force will create a multi-year roadmap to identify R&D needs as well as issues related to the manufacture, introduction and use of electric vehicles. The roadmap will be made widely available to assist not just U.S. and Chinese developers, but also the global automotive industry. It will be updated regularly to reflect advances in technology and the evolution of the marketplace.
- Public awareness and engagement. The United States and China will develop and disseminate materials to improve public understanding of electric vehicle technologies. Building on the success of the first-ever U.S.-China Electric Vehicles Forum in September 2009, the United States and China will sponsor the event annually, alternating between the two countries. The Forum will bring together key stakeholders in both countries to share information on best practices and identify new areas for collaboration.

情况说明书：美国-中国电动汽车合作草案

2009年11月17日

今天，奥巴马总统和胡锦涛主席宣布了美中电动汽车合作草案。两位国家领导人强调了彼此在加速电动汽车发展以减少对石油的依赖，减少温室气体排放，和刺激经济发展等方面的共同兴趣。草案所包括内容如下：

- ▶ 联合的标准制定。两个国家将共同发展电动汽车的通用产品和测试标准。这将包括可充电式电动汽车插头的通用设计标准，以及电池和其他相关设备的通用测试程序。每个国家目前都有很多关于自己标准的文档和数据。互相共享这些信息，并且建立统一标准将极大地加速电动汽车在两个国家的发展。
- ▶ 联合的展示。草案将两个国家的十多个城市的电动汽车展示项目联系起来。配对的城市将收集并共享关于充电规律，驾驶经验，电网整合，消费者偏好等方面的数据。联合展示将有效促进电动汽车的大规模市场引进”。
- ▶ 联合的技术发展规划。美中将联合制定关于未来几年电动汽车研究、制造、市场引入和使用的发展规划。这个发展规划将被允许广泛使用，不仅中美两国，全球的汽车产业都可以从中受益。发展规划还将定期更新以反映市场动向和技术革新。
- ▶ 公众意识和参与。美国和中国将共同宣传相关信息以促进公众的对电动汽车技术的认识。基于2009年9月第一届美中电动汽车论坛的成功举行，美中两国将每年轮流举办该研讨会。研讨会将聚集两个国家的主要相关人员来分享最佳的实践信息和确定新的合作领域。

US – China Electric Vehicle and Battery Technology Workshop

August 4 – 5, 2011 | Argonne National Laboratory | Theory and Computing Sciences Building 240

Thursday, August 4th

- | | | |
|-------|---------------------------------------------------------------|---------------------------------------|
| 9:00 | Argonne Welcome | <i>Eric Isaacs</i> |
| 9:10 | Orientation and Logistics | <i>Larry Johnson</i> |
| 9:20 | U.S. Perspective | <i>Henry Kelly</i> |
| 9:40 | China Perspective | <i>ZHANG Zhihong</i> |
| 10:00 | Overview of U.S. – China Initiatives | <i>WU Feng</i>
<i>Dave Howell</i> |
| | | |
| 10:40 | Tea/Coffee Break | |
| | | |
| 11:00 | U.S. – China Updates on the China Energy Research Centers | <i>Don Siegel and WANG Hewu</i> |
| 11:40 | Eco-partnership: A Model for US – China Energy Collaborations | <i>David Fleshler and QIN Xingcai</i> |
| 12:00 | Electric Vehicle R&D and Demonstrations in China | <i>REN Xiaochang</i> |

12:10 Lunch

- 1:30 **BREAKOUT SESSIONS**
- **Joint Battery Technology Roadmapping**
 - Diagnostics
 - Lithium Air
 - Lithium-Sulfur
 - Recycling
 - **Joint Battery Testing**
 - Test Protocols
 - Safety
 - **Joint Demonstrations and Standards Development**
 - Updates on International Data Sharing on Vehicle Demonstration Sites
 - Codes and Standards
 - Opportunity to Standardize Vehicle Testing Procedures
 - Collaboration Opportunities

5:00 Close

SPECIAL DINNER EVENT at the Mid America Club, Aon Center, Chicago

- 5:30 Depart Argonne Guest House
- 6:30 Arrive at Aon Center, begin processing on 80th Floor
- 6:45 Happy Hour
- 7:30 Dinner served
- 9:00 Depart Aon for Argonne Guest House
- 10:00 Arrive Argonne Guest House

Dress Code: *Business Casual*

Identification Required:
The Mid America Club requires each attendee to present a form of government-issued picture identification.

This could include, but is not limited to, a driver's license or passport.

Friday, August 5th

- 9:00 Breakout Sessions Continue
- 10:30 Tea/Coffee Break
- 11:00 Drafting of Joint Action Plans

12:00 Lunch

- 1:00 Drafting of Joint Action Plans Continues
- 2:15 Tea/Coffee Break
- 2:45 **CLOSING SESSION:**
Reporting on Breakout Sessions
- **Joint Battery Technology Roadmapping**
David Howell
 - **Joint Battery Testing**
Ira Bloom
 - **Joint Demonstrations and Standards Development**
Keith Hardy
- 3:30 Close

美国-中国 电动汽车和电池技术研讨会

2011年8月4-5号 | 阿岗国家实验室 | 理论和计算机科学大楼 240

星期四, 8月4号

- 9:00 阿岗欢迎仪式 *Eric Isaacs*
9:10 会议介绍和日程安排 *Larry Johnson*
9:20 美方代表讲话 *Henry Kelly*
9:40 中方代表讲话 张志宏
10:00 美国中国合作草案概况 吴锋
Dave Howell
- 10:40 中间休息 (茶/咖啡)
- 11:00 美国-中国 关于中国能源研究中心的最新情况
Don Siegel 和 王贺武
11:40 共生伙伴关系-美国中国能源合作
David Fleshler 和 秦兴才
12:00 中国汽车工程研究院电动汽车研发和测试
任晓常

12:10 午餐

- 1:30 分组讨论
- ▶ 联合电池技术发展规划
 - 诊断
 - 锂空气电池
 - 锂硫电池
 - 回收利用
 - ▶ 联合电池测试
 - 测试程序
 - 安全性
 - ▶ 联合展示和标准发展
 - 车辆展示城市国际数据共享
 - 规范和标准
 - 标准化车辆测试程序的机遇
 - 合作机遇

5:00 结束

特别晚宴

中美国俱乐部
芝加哥AON中心

- 5:30 离开阿岗招待所
6:30 到达AON中心内,
在80楼登记进入
6:45 欢乐时刻
7:30 晚餐开始
9:00 离开AON回阿岗
招待所
10:00 到达阿岗招待所

着装: 商务休闲

需要的身份证明:
中美国俱乐部要求每位与会者持有政府颁发的带照片的身份证明。这包括但不限于驾驶执照或者护照

星期五, 8月5号

- 9:00 分组讨论继续
10:30 中间休息
11:00 起草联合行动计划

12:00 午餐

- 1:00 继续起草联合行动计划
2:15 中间休息
2:45 闭幕式: 分组讨论总结汇报
 - ▶ 联合电池技术发展规划
David Howell
 - ▶ 联合电池测试
Ira Bloom
 - ▶ 联合展示和标准发展
Keith Hardy
- 3:30 结束

Bus Schedule

DAILY

A bus will circulate between the Argonne Guest House and the Building 240 Conference during the hours listed below:

➤ **Thursday, August 4**

7:45 to 9 a.m.

5 to 5:45 p.m.

➤ **Friday, August 5**

7:45 to 9 a.m.

3:30 to 4:15 p.m.

For conference attendees staying at the Aloft Hotel, Bolingbrook, please ask at the hotel's Front Desk about a shuttle bus to Argonne.

SPECIAL EVENT, Thursday, August 4

Dinner at the Mid America Club, Aon Center, Chicago, Illinois

➤ Depart Argonne Guest House for Aon Center: 5:30 p.m.

➤ Depart Aon Center and return to Argonne Guest House: 9:00 p.m.

巴士运行时间

每日巴士安排

巴士每天在以下时间来回运行于阿岗招待所和240会议大楼之间

► 星期四，8月4号

早上7:45到9点

下午5点到5点45

► 星期五，8月5号

早上7:45到9点

下午3点30到4:15

下榻Aloft宾馆的与会者，请查询酒店前台关于来阿岗试验室的巴士

特别晚宴，星期四，8月4号

晚宴在中美国俱乐部,芝加哥市AON中心

► 下午5点半从阿岗招待所出发

► 晚上9点从AON中心出发回阿岗招待所

Plenary Session 开幕式

Thursday, August 4th 星期四, 8月4号

- 9:00 – 9:20 | **Welcome and Orientation 欢迎和介绍**
- o Eric Isaacs, Laboratory Director – Welcome to Argonne
Eric Isaacs, 阿岗国家实验室主任--- 欢迎来到阿岗
 - o Larry Johnson, Argonne Transportation Center Director – Orientation, Logistics, and Workshop Format
Larry Johnson, 交通技术研发中心主任---会议介绍, 安排和研讨会形式
- 9:20 – 10:40 | **Technology Policy: U.S. – China Collaboration on the Electric Vehicle Initiative
技术政策: 美国-中国电动汽车合作启动**
- o Henry Kelly, USDOE Principal Deputy Assistant Secretary, Energy Efficiency and Renewable Energy
Henry Kelly, 美国能源部, 首席副助理部长, 能源效率和可再生能源
 - o ZHANG Zhihong, MOST, Deputy Director General, Department of New and High Technology
张志宏, 中国科技部, 副司长, 高新技术司
 - o WU Feng, Beijing Institute of Technology, Chief Scientist of National (973) Advanced Secondary Battery Project
吴锋, 北京理工大学 教授, 国家973计划《先进二次电池》项目首席科学家
 - o Dave Howell, USDOE Vehicle Technologies Program, Team Lead, Hybrid Electric Systems
Dave Howell, 美国能源部, 车辆技术项目, 项目负责人, 混合动力系统
- 10:40 – 11:00 | Tea/Coffee Break 中间休息
- 11:00 – 11:40 | **U.S. – China Updates on the China Energy Research Centers 美国-中国 关于中国能源研究中心的最新情况**
- o Don Siegel, University of Michigan, CERC Clean Vehicles Center
Don Siegel, 密西根大学, 中国清洁汽车研究中心
 - o WANG Hewu, Tsinghua University, Deputy Director, CERC Clean Vehicles Center
王贺武, 清华大学, 副主任, 中国清洁汽车研究中心
- 11:40 – 12:00 | **Eco-partnership: A Model for US – China Energy Collaborations 共生伙伴关系-美国中国能源合作**
- o David Fleshler, Associate Provost for International Affairs, Case Western Reserve
David Fleshler, 国际事务处副教务长, 西储大学
 - o QIN Xingcai, President of Tianjin Lishen Battery Joint-Stock Co., LTD.
秦兴才, 天津力神电池股份有限公司总裁
- 12:00 – 12:10 | **Electric Vehicle Research & Development at CAERI 中国汽车工程研究院电动汽车研发**
- o REN Xiaochang, President, China Automotive Engineering Research Institute
任晓常, 总经理, 中国汽车工程研究院股份有限公司
- 12:10 – 1:30 | Lunch 午餐



Breakout Sessions 分组讨论

Thursday, August 4th 星期四, 8月4号

1:30 – 5:00 | Breakout Sessions 分组讨论

- o Roundtable 1: Joint Battery Technology Roadmapping
圆桌会议 1: 联合电池技术发展规划
- o Roundtable 2: Joint Battery Testing
圆桌会议 2: 联合电池测试
- o Roundtable 3: Joint Demonstrations and Standards Development
圆桌会议 3: 联合展示和标准开发



Roundtable 1: Joint Battery Technology Roadmapping

Thursday Afternoon August 4 | Friday Morning August 5

Session Chairmen:

UNITED STATES

Dave Howell
U.S. Department of Energy

CHINA

WU Feng
Beijing Institute of Technology

OVERVIEW

- o Studies on High Power Batteries (WU Feng, BIT)

DIAGNOSTICS

- o Diagnostic Activities within DOE programs (YANG Xiao Qing, BNL)
- o Enhancing the Rate Capability of Nanomaterials in Lithium Ion Battery Electrodes (SUN Shigang, Xiamen University)

LITHIUM AIR

- o Challenges and Opportunities in Rechargeable Li-air Batteries (YANG Shao-Horn, MIT)
- o Lithium Air Battery Activity at Argonne (Khalil Amine, ANL)
- o Multi-electron Reaction Electrode Materials and Li-Air Battery (WU Chuan, BIT)

LITHIUM-SULFUR

- o Challenges and Solutions for Lithium-Sulfur Batteries (LIANG Chengdu, ORNL)
- o Factors Affecting Li-S Specific Energy (John Affinito, Sion Power)
- o Strategies for Improvement of Performances of S/C composite electrode (CHEN Jian, Dalian ICP)
- o Study on Novel High Capacity Lithium Sulfur Battery and Key Materials, (CHEN Renjie, BIT)

RECYCLING

- o Comparison of Processes for Recycling Lithium-Ion Batteries (Linda Gaines, ANL)
- o Current Situation for Recycling and Reuse of Spent Batteries in China (LI Li, BIT)
- o Large Format EV Battery Recycling: Challenges and Opportunities (Shane Thompson, Kinsbursky Brothers)

Roundtable 1: Joint Battery Technology Roadmapping

圆桌会议 1: 联合电池技术发展规划

周四下午, 8月4号 | 周五早上, 8月5号

会议主席

美国

Dave Howell
美国能源部

中国

吴锋
北京理工大学

概况

- 高能源动力电池的研究 (吴锋, 北京理工大学)

诊断

- 美国能源部研究项目中的电池诊断 (杨晓青, 布鲁克海文国家实验室)
- 加强锂电池电极中纳米材料的倍率性能 (孙世刚, 厦门大学)

锂空气

- 可充电式锂空气电池研究的挑战和机遇 (YANG Shao-Horn, 麻省理工大学)
- 阿岗实验室锂空气电池研究 (Khalil Amine, 阿岗国家实验室)
- 多电子反应电极材料和锂空气电池 (吴川, 北京理工大学)

锂-硫

- 锂-硫电池研究的挑战和解决办法 (梁成都, 橡树岭国家实验室)
- 影响锂-硫电池比能量的因素 (John Affinito, Sion 能源)
- 改进锂-硫电池复合电极性能的办法 (陈剑, 中科院大连物化所)
- 新型高容量锂-硫电池和关键材料的研究 (陈人杰, 北京理工大学)

回收

- 回收锂离子过程的比较 (Linda Gaines, 阿岗国家实验室)
- 中国在废旧电池回收与资源化方面的研究现状 (李丽, 北京理工大学)
- 大型电动汽车电池回收: 挑战和机遇 (Shane Thompson, Kinsbursky兄弟公司)

Roundtable 1: Joint Battery Technology Roadmapping

Issues to be Addressed

Battery materials and chemistries: Discuss the next generation battery technology beyond lithium ion. Focus on lithium air and lithium sulfur. Provide supporting data and discuss the potential problems in relation to cost, safety, calendar life, and performance

Advanced characterization techniques to understand failure: Discuss the different characterization tools using under the ABRT and BAAT. Presenter will collect data from all DOE labs and will explain how the techniques work and what kind of results to expect using examples.

In situ techniques to characterize materials and electrodes: Discuss synchrotron based in situ and ex situ soft x-ray absorption spectroscopy (XAS) techniques which allows for the distinguish ion of the structural differences between surface and bulk of electrodes using both electron yield (EY) and fluorescence yield (FY) detectors simultaneously.

Developing modeling capability to predict life of batteries: Discuss Technology Life Verification Testing (TLVT) model that can help predict battery life capability with high statistical confidence and minimal testing. Both a battery life model and error model are needed for accurate life prediction. The life model should adequately cover the anticipated range of stress factors, and the error model must account for both manufacturing variability and measurement error. Based on these models, an estimate of life can be determined through Monte Carlo simulations and verified with actual test data. A user-friendly software tool was developed for the analysis and simulation of battery test data using statistically robust methods based on a default model. A description of the TLVT methodology and the available software tool will be presented.

Roundtable 1: Joint Battery Technology Roadmapping

圆桌会议 1: 联合电池技术发展规划

亟待解决的问题

电池材料和化学：讨论下一代锂离子电池的技术问题。重点是锂空气和锂硫电池。提供支持数据并讨论与成本，安全，寿命和性能相关的潜在问题。

先进的表征技术来了解失败：讨论在ARBT和BAAT之下的各种表征方法。发言人会收集各个能源部下属试验室的数据，并会通过举例来解释原理和可能的试验结果。

原位技术表征材料和电极：讨论基于原位和非原位低能X射线吸收光谱（XAS）同步辐射技术，采用电子和荧光检测器分析电极的表面和内里之间的结构差异

开发可以预测电池寿命的模型：讨论技术寿命测试模型来帮组预测电池寿命，并拥有很高统计可信度和最少的测试次数。同时需要电池寿命模型和纠错模型才能实现寿命预测的准确性。这个寿命模型应涵盖足够的应激因素的预期范围。纠错模型应涵盖制造可变性和测量误差。基于这些模型，关于寿命的预测可以通过蒙地卡罗模型用实际数据来核实。开发一个方便用户使用的软件，通过以默认模型为基础的统计方法来分析和模拟电池测试数据。

Roundtable 1: Joint Battery Technology Roadmapping

圆桌会议 1: 联合电池技术发展规划

Action Plan 行动计划

Scope 范围

- o Provide the scope of collaboration for your focus area (for example, cooperation on test protocols)
请提供关于你的研究领域的合作范围（例如：协调草案或者测试协议）

Objectives 目标

- o Outline in as much detail as possible the proposed goals of the collaboration (i.e., what specifically are the desired results?)
请概述关于合作目标尽可能多的细节（例如：具体需要实现哪些结果等）
- o Describe the mutual benefits if the results are achieved
请描述在期望结果实现后双方可得到的共同利益
- o If possible, describe what the desired results will look like (e.g., joint publications; case studies; standardized procedures; etc)
如果可能，请描述会有哪些期望成果（例如：联合发表文章，案例分析，标准化程序等）

Coordination 协调

- o Agree on the lead person in the U.S. and China who will be responsible for coordinating the relevant research projects within the home country and communicating with the overseas counterpart.
美国和中国各推举一个负责人来负责在本国的相关研究项目的协调，以及和对方相关人员的沟通。



Roundtable 1: Joint Battery Technology Roadmapping

圆桌会议 1: 联合电池技术发展规划

Action Plan 行动计划

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Roundtable 2: Joint Battery Testing

圆桌会议2: 联合电池测试

Thursday Afternoon August 4 | Friday Morning August 5

周四下午, 8月4号 | 周五上午, 8月5号

Session Chairmen:

会议主席

UNITED STATES

美国

Ira Bloom

Argonne National Laboratory

Ira Bloom, 阿岗国家实验室

CHINA

中国

Qiu Xinping

Tsinghua University

邱新平, 清华大学

TEST PROTOCOLS

- o Battery Testing and Life Estimation in the US (Ira Bloom, ANL)
美国电池测试和寿命估计 (Ira Bloom, 阿岗国家实验室)
- o Battery Testing Standards (QIU Xinping, Tsinghua University)
电池测试标准 (邱新平, 清华大学)

SAFETY

- o Failure Analysis and Battery Internal Short Circuit Testing (Mahmood Tabaddor, Underwriters Laboratories)
失败分析和电池内短路测试 (Mahmood Tabaddor, 产品安全认证机构)
- o Improvements in Li-ion batteries (HE Xiangming, Tsinghua University)
锂离子电池改良 (何向明, 清华大学)



Roundtable 2: Joint Battery Testing

Issues to be Addressed

BATTERY PERFORMANCE AND DURABILITY TEST PROTOCOLS

Issue: In the US, battery performance and life testing is an application-based, analytical process. Here, challenging performance and durability targets and goals are developed by the United States Advanced Battery Consortium for applications, such as pure electric, hybrid-electric and plug-in hybrid electric vehicles. The test procedures are derived from the goals.

Issue: The growing market for electric vehicles (EVs) and plug-in hybrid vehicles (PHEVs) is driven by performance, vehicle range (higher energy, higher capacity), and battery pack life (cycle life). The near-term generations of these battery packs will be lithium-ion cell chemistries ranging from 5 to 50 kWh and the inherent safety issues and potential failure modes of these EV and PHEV batteries are of increasing concern. Unlike aqueous-based NiMH or NiCd batteries, most conventional lithium-ion cells contain organic solvent-based electrolyte that is highly flammable and use cathode materials that can undergo exothermic, autocatalytic thermal runaway. The failure of these cells can be catastrophic and are well documented in the consumer electronics industry. In the US, the results of the test are analytically compared to the EUCAR scale.

Questions to be addressed / talking points

- o What is the approach to testing used in China? In the US, it is an application-driven, analytical approach which shows the promise of a given technology at the pre-competitive stage.
- o How do the approaches compare? Is there commonality?
- o How is life estimation performed in China?
- o Are there differences in data quality? Are the procedures validated against real-world results?
- o Is post-test analysis performed?

Roundtable 2: Joint Battery Testing

圆桌会议2: 联合电池测试

亟待解决的问题

电池性能和持久性测试协议

问题: 在美国, 电池性能和寿命是以应用为基础的, 可分析的过程。在这里, 高性能和寿命的技术目标是由美国先进电池联合会为电池的应用所制定的, 例如纯电动, 混合动力和可充电式混合动力汽车。测试程序也是根据目标而制定的。

问题: 电动汽车和可充电式混合动力汽车市场的发展依靠电池的性能, 电行驶里程和电池寿命来推动。下一代电池组将会是功率5到50千瓦小时的锂离子电池, 内在的安全问题以及可能的失败模式越来越引起关注。和水性镍氢或镍镉电池不一样, 大多数传统的锂离子电池的电容液含有非常易燃的有机物, 并且所使用的阴极材料会不断放热, 发生自催化热失控。

需要回答的问题/讨论点

- 中国使用的测试方法是什么? 在美国, 它是在一个给定技术在竞争前阶段以应用为本的分析方法。
- 中美两国的方法能否进行比较? 有什么共通性?
- 中国对电池的寿命预测如何?
- 数据质量有哪些区别? 这些测试程序是否验证现实应用中的结果?
- 是否执行了测试后分析?

Roundtable 2: Joint Battery Testing

Issues to be Addressed

BATTERY SAFETY TESTING

Issue: Develop an understanding of the similarities and differences between the two approaches to safety testing. Outline an experiment which provides a means of directly comparing the results

- o What safety testing standards or protocols are in place for the lithium-ion battery market in China (vehicle or consumer electronics applications – what testing is required, who monitors and ensures testing, etc.)?
- o What research is being done and implemented to mitigate or address the safety hazards associated with lithium-ion chemistries in China?
- o Are there currently any standards or certifications for HEV, EV or PHEV lithium-ion batteries in China? If not, are their plans to certify vehicle batteries in China?
- o What is being done to address issues related to lithium-ion battery field failures (new materials, manufacturing quality assurance, etc.)?

Opportunities for collaboration

- o Performance/durability – There is an effort between the US, the EU, Japan and, possibly, South Korea to perform side-by-side tests on a given battery chemistry at the 1-Ah cell level. This would be a good way to leverage resources and results. Are the Chinese interested in (a) contributing their protocols to the greater experiment and (b) participating? All results will be shared and compared. A publication is the expected outcome and may lead to a standard.
- o Safety – Would the Chinese safety test sites be interested in performing experiments to compare how the respective safety tests are performed and how the results compare?

Roundtable 2: Joint Battery Testing

圆桌会议2: 联合电池测试

亟待解决的问题

电池安全测试

问题: 了解中美两种测试方法的相似和不同。规划一个能直接比较测试结果的试验方法。

- 中国锂离子电池的测试标准和协议有哪些（车辆或者消费电子应用-需要哪些测试，谁来监控和确保试验的准确）？
- 在中国，正在采取什么样的研究和措施，以缓解或解决锂离子所带来的化学危害？
- 中国目前有哪些针对混合动力汽车，电动车和可充电式混合动力汽车的标准和认证？如果没有，是否有认证车用电池的规划？
- 目前正在采取哪些关于解决锂离子电池应用故障问题措施（新材料，制造质量控制，等）？

合作机遇

- 性能/持久性-现在美国，欧洲，日本，可能还有韩国正在一起对给定的电池在1-Ah级别上进行多边测试. 这是一个有效利用多方资源和试验结果的好方法。中国是否也有兴趣1) 贡献他们的测试协议来扩大这一合作和2) 参与到这个合作试验中来？所有的结果都将共享和比较。期望的合作结果是共同发表成果作为将来制订测试标准的基础。
- 安全性-中国安全测试基地是否有兴趣做安全试验来和美国相应的试验进行比较，例如 实验是如何进行的，结果如何比较？

Roundtable 2: Joint Battery Testing

圆桌会议2: 联合电池测试

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Coordination 协调

- o Agree on the lead person in the U.S. and China who will be responsible for coordinating the relevant research projects within the home country and communicating with the overseas counterpart.
美国和中国各推举一个负责人来负责在本国的相关研究项目的协调，以及和对方相关人员的沟通。



Roundtable 2: Joint Battery Testing

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Roundtable 3: Joint Vehicle Demonstrations and Standards Development

圆桌会议3: 联合车辆展示和标准发展

Thursday Afternoon August 4 | Friday Morning August 5

周四下午, 8月4号 | 周五上午, 8月5号

Session Chairmen:

UNITED STATES

Keith Hardy
Argonne National Laboratory

CHINA

Li Jianqiu
Tsinghua University

UPDATES ON INTERNATIONAL DATA SHARING ON VEHICLE DEMONSTRATION SITES

- o EV Project Overview and Los Angeles Data Collection Results (Jim Francfort, INL)
- o Status of the Shanghai Electric Vehicle Data Collection Program (DING XiaoHua, SIACG)
- o China's New Energy Vehicle Program: A Status Report (GU Zhaoning, SAE China)

CODES AND STANDARDS

- o Potential US standards for Electric Vehicles (Eric Simmon, NIST)
- o Introduction to China's Electric Vehicle Standardization Work (ZHOU Rong , CATARC)

OPPORTUNITY TO STANDARDIZE VEHICLE TESTING PROCEDURES

- o EV Test Procedures in the US (Mike Duoba, ANL)
- o EV Testing Standards in China (ZHANG Hao, CAERI)

COLLABORATION OPPORTUNITIES

- o Potential Global E-Mobility Cooperation Plan (Keith Hardy, ANL)

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中国

李健秋
清华大学

车辆展示项目国际数据共享最新情况

- o 电动汽车项目该款和洛杉矶数据收集结果 (Jim Francfort, 爱达荷国家实验室)
- o 上海电动汽车数据收集项目现状 (丁晓华, 上海国际汽车城 (集团) 有限公司)
- o 中国新能源汽车项目: 现状报告 (谷兆宁, 中国汽车工程协会)

规则和标准

- o 潜在美方电动汽车标准 (Eric Simmon, 国家标准技术所)
- o 中国电动汽车标准化工作介绍 (周荣, 中国汽车技术研究中心)

标准化汽车测试程序的机遇

- o 美国电动汽车测试程序 (Mike Duoba, 阿岗国家实验室)
- o 中国电动汽车测试标准 (张浩, 中国汽车工程研究院)

合作机会

- o 可能的全球电子移动合作计划 (Keith Hardy, 阿岗国家实验室)

Roundtable 3: Joint Vehicle Demonstrations and Standards Development

Issues to be addressed

International Data Sharing on Vehicle Demonstration Sites:

Key Questions

1. Is comparable vehicle/infrastructure data being collected?
If not, what is required to harmonize the data collection?
2. Is comparable data analysis performed and what is the form of the (summary) information/report?
If not, what is required to harmonize the analysis and reporting?
3. Who will perform the comparative analysis (LA versus Shanghai) and what is a reasonable schedule to present meaningful (interim) results?

Codes and Standards: Key Questions

1. How do Chinese, European and US standards compare (i.e., the relationships between specific standards)?
Are there gaps/overlaps that need to be addressed (coordinated with the SDOs)?
2. What specific standards are incompatible? Do the incompatible standards significantly impact global OEMs/suppliers, i.e., how big a deal is it to supply regionally-specific components?
3. Do OEMs/suppliers want to harmonize standards globally (or are they satisfied with the lack of harmonization)?
If so, are efforts being made to harmonize the standards that are considered the most important (i.e., those with the most impact on performance, cost or production schedule)?
4. How could U.S. and Chinese governments help the effort to harmonize the critical standards?

Opportunity to Standardize Vehicle Testing Procedures:

Key Questions

1. How do Chinese, European and US vehicle testing standards/procedures compare (i.e., the relationships between specific standards)?
2. Are there significant differences? ... If so, what is the impact?
3. Are efforts being made to resolve the differences (by the SDOs)?
4. How could U.S. and Chinese governments help harmonize vehicle test procedures?

Collaboration Opportunities: Key Questions

Background: The EU and US have been discussing an 'E-Mobility Work Plan' to establish a common approach and schedule for joint EV and smart grid standardization activities, transportation of Li-Ion batteries and collaboration on other issues such as battery life cycle management and IT/data security.

1. Is the Chinese government interested in participating in the process to identify critical issues of mutual interest?
2. If so, how might we work together to address the issues from a global perspective?

Roundtable 3: Joint Vehicle Demonstrations and Standards Development

圆桌会议3: 联合车辆展示和标准发展

亟待解决的问题

对汽车展示点的国际数据分享：主要问题

1. 是否在收集可比较的车辆/基础设施数据？如果没有，需要什么来协调数据收集？
2. 是否分析了可比较数据？采用什么形式的信息总结/报告？如果没有，需要什么来协调分析和整理？
3. 谁来执行比较分析（洛杉矶 Vs 上海）？什么时候可以展示两个城市的比较结果？

规范和标准

1. 中国，欧洲和美国的标准比较（例如各种特定标准之间的关系）？是否有漏洞/重叠需要解决（与标准化组织的协调）？
2. 有什么具体标准是不兼容的？不兼容的标准是否会显著影响全球的原始设备制造商/供应商，例如供应区域化零部件是否是个大问题？
3. 原始设备制造商（OEM）/供应商是否期望全球统一标准（或他们满足于缺乏统一标准）？如果是这样，为达到统一的标准正在作出努力是否被认为是最重要的（即那些对性能，成本或生产进度有最大影响的）？
4. 美国和中国政府如何帮助为协调关键标准做出的努力？

车辆测试程序标准化机遇：主要问题

1. 如何比较中国，欧洲和美国的汽车测试标准/程序（即具体标准之间的关系）？
2. 标准之间有显著的区别吗？如果是，影响是什么？
3. 是否正在解决这些不同呢（由标准化组织主导）？
4. 美国和中国政府应如何帮助协调车辆测试程序？

合作机遇：主要问题

背景：欧盟和美国一直在探讨一个“电子移动工作计划”为电动汽车和智能电网标准化合作，锂离子电池的运输和其它合作例如电池寿命管理和电子数据安全等建立统一的研究方法和安排

1. 在参与确定全球性关键的问题的过程中双方有哪些共同利益？
2. 我们如何共同努力来从全球角度解决问题？

Roundtable 3: Joint Vehicle Demonstrations and Standards Development

圆桌会议3: 联合车辆展示和标准发展

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Breakout Sessions 分组讨论

Friday, August 5th 星期五, 8月5号

9:00 – 10:30 | Breakout Sessions Continue 继续分组讨论

- o Roundtable 1: Joint Battery Technology Roadmapping
圆桌会议1: 联合电池技术发展规划
- o Roundtable 2: Joint Battery Testing
圆桌会议 2: 联合电池测试
- o Roundtable 3: Joint Demonstrations and Standards Development
圆桌会议 3: 联合展示和标准开发

10:30 – 11:00 | Tea/Coffee Break 中间休息

11:00 – 12:00 | Drafting of Joint Action Plans 联合行动计划起草

12:00 – 1:00 | Lunch 午餐

1:00 – 2:15 | Drafting of Joint Action Plans Continues 继续联合行动计划起草

2:15 – 2:45 | Tea/Coffee Break 中间休息

CLOSING SESSION

2:45 – 3:30 | Reporting on Breakout Sessions

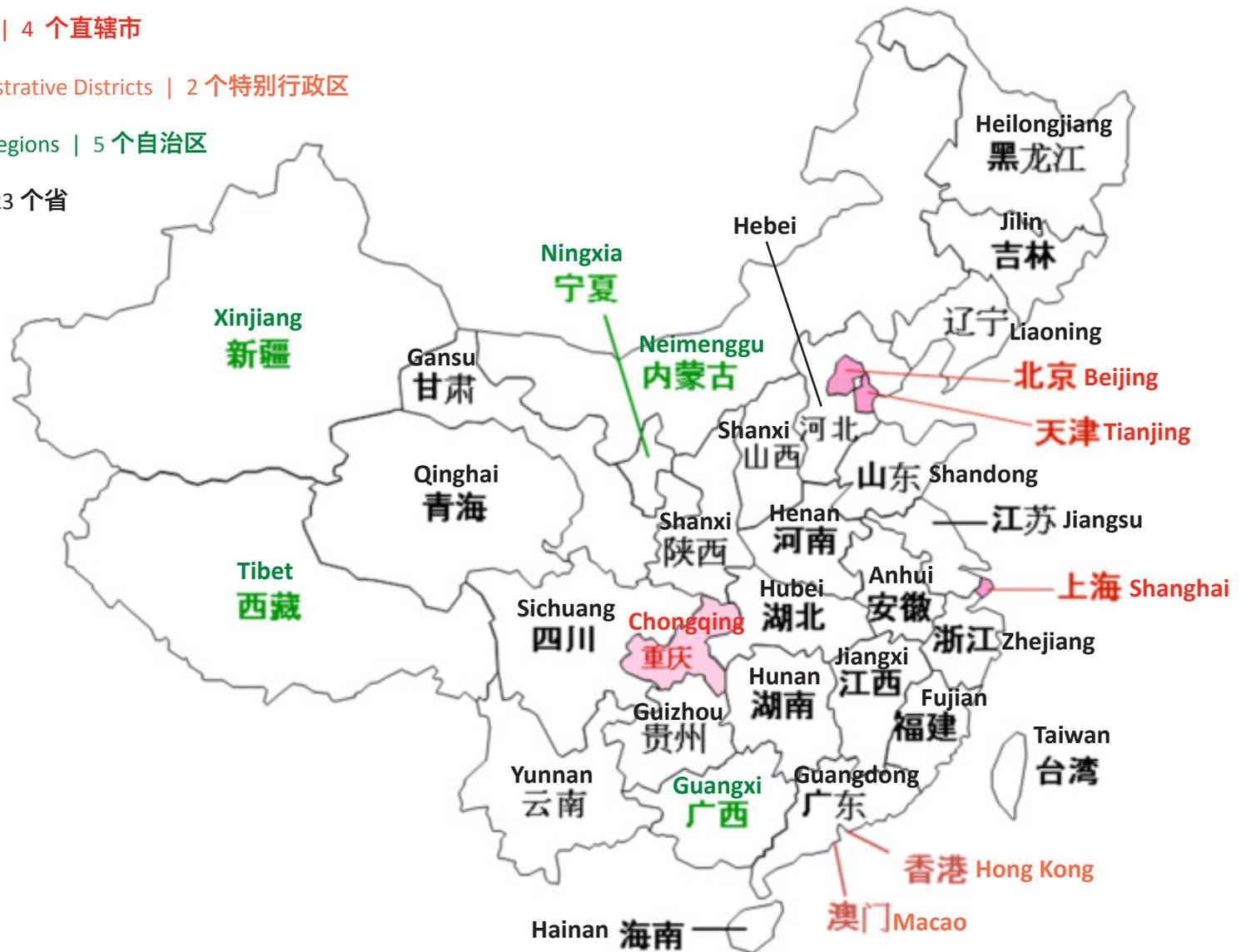
- o Roundtable 1: David Howell Joint Battery Technology Roadmapping
圆桌会议 1: David Howell 联合电池技术发展规划
- o Roundtable 2: Ira Bloom Joint Battery Testing
圆桌会议 2: Ira Bloom 联合电池测试
- o Roundtable 3: Keith Hardy Joint Demonstrations and Standards Development
圆桌会议 3: Keith Hardy 联合展示项目和标准发展

3:30 Close 闭幕



People's Republic of China 中华人民共和国

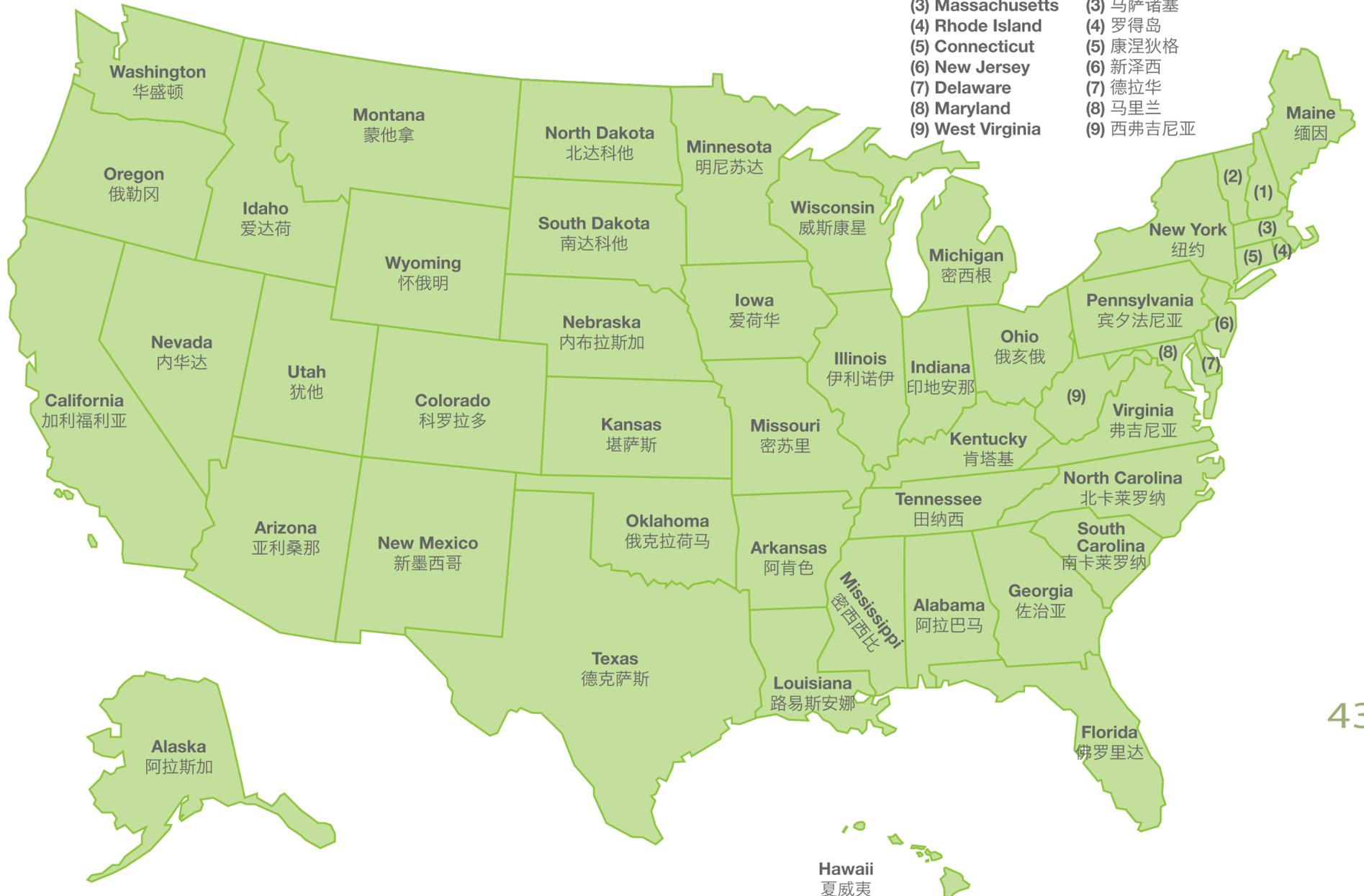
- ▶ 4 Municipalities | 4 个直辖市
- ▶ 2 Special Administrative Districts | 2 个特别行政区
- ▶ 5 Autonomous Regions | 5 个自治区
- ▶ 23 Provinces | 23 个省



The 50 States in the USA

The “Lower 48” plus Alaska and Hawaii

- | | |
|-------------------|-----------|
| (1) New Hampshire | (1) 新罕布什尔 |
| (2) Vermont | (2) 佛蒙特 |
| (3) Massachusetts | (3) 马萨诸塞 |
| (4) Rhode Island | (4) 罗德岛 |
| (5) Connecticut | (5) 康涅狄格 |
| (6) New Jersey | (6) 新泽西 |
| (7) Delaware | (7) 德拉华 |
| (8) Maryland | (8) 马里兰 |
| (9) West Virginia | (9) 西弗吉尼亚 |





A T-shaped Chevrolet Volt battery replica (left) is positioned near a 2011 Chevrolet Volt electric vehicle. The car's lithium-ion battery is based on technology developed at Argonne National Laboratory.



4th US-China Electric Vehicle and Battery Technology Workshop

August 4-5, 2011

Argonne National Laboratory

www.cse.anl.gov/us-china-workshop-2011